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FAX COVER SHEET

Date: February 16, 2000

TO (Organization): U.S. EPA

ATTENTION: SHELDON MULLER, ESQ.

CITY: DENVER, CO

FAX NUMBER: (303) 312-6953

FROM: Joshua B. Epel

Number of pages (including this page): ___

Hard copy to follow? ___ yes ___ no

J.E. REYNOLDS & ASSOCIATES

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February 7, 2000

Mr. Joshua Epel
Gabelhouse & Epel
1050 17th Street
Suite 1730
Denver, CO 80265

Re: Rico Development Corp.
Civil Action 99-M-1386
St. Louis Tunnel Wastewater Treatment System

Dear Josh:

We've had an opportunity to review the reports and memoranda supplied by your office describing the background of the St. Louis Tunnel water treatment design and operation. To summarize our preliminary findings:

- The St. Louis Tunnel Treatment Facility has not operated for the past 3 years
- There is a large accumulation of sludge in settling ponds upstream of Outfall 002 discharging to the Delores River.
- The last operator of the system, Mr. Grady Leavell, was contacted by phone. He described the latest configuration as a 5 ft. by 6 ft. mixing box (no agitator) for reacting a dry feed of burned pebble lime (CaO) with the tunnel discharge on a timed interval of 10 seconds on and 5 minutes off. The first of about seven settling ponds (Pond No. 18) is nearly full of settled unreacted lime and precipitated metal hydroxides so that the treated water has insufficient retention time for further reaction to equilibrate to a constant pH. Control of reaction pH was not used. Monitoring of Outfall 002 pH was the only means of adjusting the quantity of lime.
- Present condition of the treatment equipment and settling ponds is unknown
- Zinc and cadmium concentrations appeared to be the metals out of compliance while the treatment was in operation. Review of limited sampling data indicates that the treatment pH was generally too low for effective removal of these metals. The attached solubility curve shows that the treatment pH must be in the range 9-10.5. Too high a pH can be equally detrimental in precipitating zinc with lime.
- We conclude at this point that the treatment operation will require some improvements in metering of lime, mixing and probably settling in the sludge-filled pond system.

We recommend the following action:

- Visit the site as early as conditions permit for inspection by T. McNulty and myself. This would likely be toward the latter part of March. The purpose of the one-day visit would be to:
  - Collect samples of St. Louis tunnel discharge for a brief treatability test in our lab in Golden, Colorado using a sample of burned lime pebble used in previous operation

to determine reactivity and consumption versus hydrated lime. Also collect samples of Outfall 002, pond sludge, and Old Outfall 001.

- Make an engineering evaluation of the design and present condition of the existing treatment equipment and settling ponds. Use this information to develop other treatment options including relocation , equipment modifications, and reagents.
- Determine need for de-sludging of upper ponds and recommend options for implementation.
- Estimate annual treatment costs including labor, reagents and monitoring.
- Prepare an audit report with recommendations for a forward program.

I believe both Terry McNulty and I are flexible as to timing of a site visit and can adjust our schedules to deal with the any adverse weather on one or two day notice.

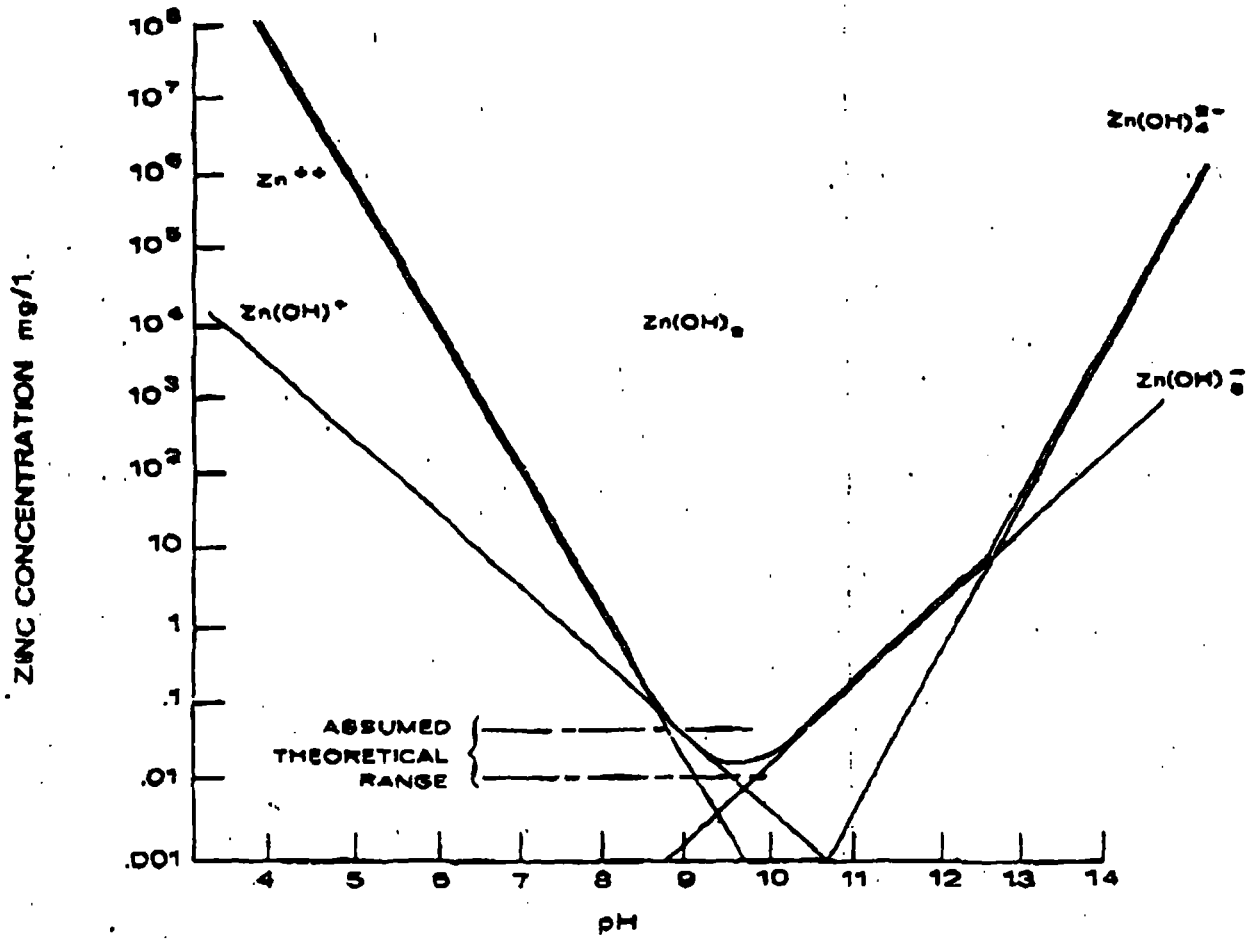
Please let us know if you need additional information.

Sincerely,

J. E. Reynolds

JER:ps

FAX copy: T.P. McNulty and Assoc.



REACTIONS:

$Zn(OH)^+ = Zn^{++} + OH^-$	$K = 9.1 \times 10^{-6}$
$Zn(OH)_2 \downarrow = Zn^{++} + 2\ OH^-$	$K_{sp} = 4.5 \times 10^{-17}$
$Zn(OH)_3^- = Zn^{++} + 3\ OH^-$	$K = 1.78 \times 10^{-14}$
$Zn(OH)_2^= = Zn^{++} + 4\ OH^-$	$K = 8 \times 10^{-16}$

Figure 3. Zinc Solubility (3)

TO : File/cc:Jim Reynolds

FROM : Terry McNulty
February 8, 2000

RE : Rico Development Corp./St. Louis Tunnel

For the record, I have reviewed the information packet sent to us by Josh Epel and I want to mention a couple of thoughts which can be followed with the aid of the attached "cartoon".

The original plan involved diversion of Blaine Tunnel water through an interconnecting series of underground workings into the St. Louis Tunnel, thence into the settling ponds along with lime. That was not such a bad idea, but it depended on perpetual hydraulic continuity through those workings, which were probably a combination of internal shafts ("winzes") and horizontal access or connection tunnels ("drifts" and "crosscuts"). Virtually all underground workings in hardrock mines are supported by wooden timbers which have a finite life ranging from about 5 to 50 years, depending on a lot of factors. Although the Rico Mine was worked as recently as the late-1970s, most of the timbers probably were placed during an earlier time. I suspect that much of the timbering has collapsed and that some of the original conduit has caved, partially or completely blocking solution movement from the Blaine Tunnel to the St. Louis mine workings. This is consistent with the fact that, when I visited on January 15, brown icicles had formed on the south wall of the concrete channel through which Silver Creek flows as it passes to the north of the Blaine portal. That is, acidic water has collected in the Blaine Tunnel and flows out through the portal when temperatures permit. The color of the water (and the icicles) is indicative of iron compounds and acidity.

The September 16, 1997 letter from G. N. Brand (WQCD-Durango) to Akers and Lenkey (WQCD-Denver) states on page 2 that the Blaine Tunnel was discharging 1-3 GPM of water at pH 2.2-2.3. The May 1992 DMR for the St. Louis Tunnel shows a pH of 6.8-7.3. The July 29, 1985 EPA report submitted to Schwab does not show the Blaine Tunnel on the Sample Location Map, but I suspect that it was downstream of Sample Location SW-1 because there was a sharp increase in zinc between SW-1 and SW-2, the former being very clean water (14μg/liter zinc), whereas SW-2 contained 283 μg/liter zinc. Discharge from the Blaine Tunnel was not sampled at the time, nor was its flowrate given, so any attempt to characterize it would be speculation. The zinc concentration at SW-4 was very high (10,800 μg/liter), but it was diluted downstream to 561 μg/liter at SW-3. SW-4 clearly was a seepage sample, rather than a sample of the Creek itself, and was down-gradient from the covered tailings dumps (F, G, and H on the cartoon) wherein it originated. A simple material balance based on the three zinc concentrations shows that the seepage amounted to about 8% of the stream flow above confluence with the seep. Furthermore, the SW-2 and SW-3 zinc concentrations suggest that the zinc loadings contributed by the Blaine Tunnel and the seepage were about equal.

Stream samples SW-6, -7, and -8 along the Dolores River indicated that the St. Louis tunnel (or residual contamination in the soils under the settling ponds) was contributing zinc, as the respective zinc concentrations were 30, 47, and 90 μg/liter. However, if we assume that dilution

of the Dolores River by Silver Creek was negligible, it looks like the Blaine Tunnel and the tailings seep(s) in 1985 were contributing about 3.5 times as much zinc as the St. Louis Tunnel.

Lacking any other information, but assuming that 1985 conditions still apply, it appears that the current situation might be essentially as follows:

A. The Blaine Tunnel is draining into Silver Creek;
B. Seepage from one or more of the tailings cells is flowing into Silver Creek;
C. The St. Louis Tunnel is draining directly into the Dolores River;
D. Seepage from tailings may be as big a problem as Blaine Tunnel drainage;
E. St. Louis Tunnel drainage may be the smallest contributor.

If the previous tentative conclusions are correct, it would seem that the most important task (after we have collected samples and had them analyzed and have estimated flowrates at various times of the year) will be to prevent the seepage and Blaine Tunnel drainage from entering Silver Creek. The Blaine Tunnel drainage should be fairly easy to isolate and collect, but the seepage (if it is still occurring and if it still is a major metal source) could pose a problem because it may occur over a considerable length of stream frontage. Assuming, however, that both can be collected, the question then will be whether to convey them in a surface pipeline to the existing treatment plant or to construct a new treatment plant near the Rico mill - possibly in the shop/warehouse building. If the latter were done, construction of sludge settling ponds atop the three covered tailings cells might be a possibility. This leaves the St. Louis Tunnel drainage which, if it still is a problem, might require reactivation of the original settling ponds with an upgraded treatment plant. It may also be a candidate for passive treatment. In any case, I have gotten the impression that spring flowrates from the St. Louis can be very high, so it might make a lot of sense to separate the two dominant metal sources from a large volume of relatively clean water.

These are about all of the half-baked conclusions that I can squeeze out of old and fragmentary data, but perhaps they will provide some guidance for a sampling and field evaluation program.

RICO MINE and MILL